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**United States Patent** [19][11] **Patent Number:** 5,331,968**Williams et al.**[45] **Date of Patent:** Jul. 26, 1994**[54] INDUCTIVE PLETHYSMOGRAPHIC  
TRANSDUCERS AND ELECTRONIC  
CIRCUITRY THEREFOR**

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- [51] **Int. Cl.<sup>5</sup>** ..... A61B 5/02
- [52] **U.S. Cl.** ..... 128/721; 128/722
- [58] **Field of Search** ..... 128/734, 721, 722, 716, 128/719, 670, 671

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[57]

**ABSTRACT**

The present invention is an apparatus and method for improving the detection of the inductance "signal" generated by an inductive plethysmograph (12). Signal detection is improved by modifying the design of the inductive plethysmograph (12) and also by improving the design of the associated circuitry. By virtue of these improvements, the associated circuitry may be located remotely rather than on the transducer, as is the current practice. In one aspect of the invention, the impedance matching transformer (14) joining the inductive plethysmograph (12) to the oscillator (16) is selected such that the inductance of its primary winding is greater than about ten times the reflected inductance of the inductive plethysmograph (12) and the cable (24) joining it to the transformer (14). In accordance with another aspect of the invention, the inductive plethysmograph (12) is modified such that the conductor (20) incorporated therein encircles the relevant body portion a plurality of times. In yet a further aspect of the invention, the cable (24) connecting the inductive plethysmograph (12) to the transformer (14) is selected such that the ratio of the diameter of its screen to the diameter of its center conductor is minimized for reducing the inductance per unit length thereof.

**31 Claims, 3 Drawing Sheets**